APPENDIX I

GEOMORPHIC INVESTIGATION OF THE PARADISE LANE ARCHAEOLOGICAL SITE

written by:

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APPENDIX I (cont.)

Introduction

During November and December of 1985, the geomorphic history of the Paradise Lane archaeological site was studied. The goal of the study was to define the physiography of the site during possible periods of human occupation.

Location, Physiography, and Geologic Setting of the Study Area

The Paradise Lane archaeological site is located at the end of Paradise Lane, a residential street which extends southeast from Red Mill Road approximately 0.1 mile southeast of the intersection of Red Mill Road with four tracks of Penn Central Railroad.

The Paradise Lane site sits on an upland surface approximately 1 mile southeast of White Clay Creek. The total relief in the immediate vicinity of the site is less than 10 feet (USGS 1:24,000 Newark East Quadrangle), and probably the total relief is less than 5 feet.

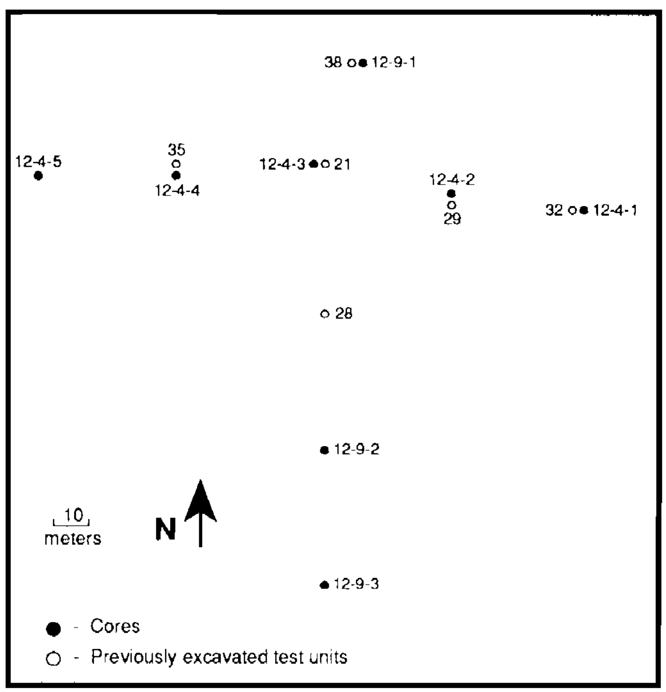
The topography at the site is developed on the Columbia Formation (Woodruff and Thompson 1972). This unit consists of sands and gravels of Pleistocene (?) Age. The Columbia Formation is about 10 feet thick at the Paradise Lane site (Woodruff and Thompson 1972). It overlies the sands, silts, clays, and (rare) gravels of the Potomac Formation of Cretaceous Age.

Methods

Sediment samples were obtained with a 3-inch diameter bucket auger. Auger holes were placed along two transects which extend north and south across the site (Figure 58). The texture of the sediment was described using nomenclature of Folk (1968); colors were obtained from the Rock Color Chart (1980).

FIGURE 58

Locations of Cores



Results

The soils of this site are quite uniform (detailed descriptions are located in Appendix I-A). Generally the upper 10-30 cm consists of moderate yellowish brown clayey silt. Occasionally, these sediments may contain pebbles or sand. Farther below the surface, the sediments become increasingly sandy and the concentration of pebbles increases. A meter or so below the surface the sediments consist almost exclusively of silty sand and gravel (granules and pebbles). There is, however, a color change in the sediments across the study area. In the northern part of the area, sediments are predominantly light or yellowish brown, while the three southernmost holes reveal very pale orange sediments. Textures, however, are fairly uniform throughout.

A large hole (approximately 5 meters across) at the extreme western end of the east-west (see description of Core # PL12-4-85-5) transect was particularly enlightening. Although the sediments here are generally similar to those found elsewhere, the walls of the hole provide a long, continuous exposure which clarifies the nature of these sediments.

Two important observations were made while studying the walls of the hole. First, pebbles and granules are found at all depths, though they are more frequent at greater depths. Second, there are no discontinuities within the section which could represent buried soils or other drastic changes in the Holocene history of the area.

Discussion

The uniformity of these sediments suggests strongly that the physiography of this region has not changed significantly during the Holocene. The only important variability is a change in color from north to south across the study area. Because textures are uniform, this color change is probably a result of subtle changes inherited from the underlying Columbia Formation.

These conclusions are supported by the continuous section observed in the walls of the hole. Furthermore, the presence of gravel throughout the section precludes any significant deposition since the deposition of the Columbia Formation. The only possible source of additional sediments would be wind-blown fine sands and silts. Gravel cannot be transported by wind, and therefore the gravel must have been derived from the Columbia Formation. Since the gravel extends throughout, the other sediments were probably also derived from the Columbia Formation (with some input of small amounts of organics).

Conclusion

There is no evidence to suggest that the geomorphic setting of the Paradise Lane site has changed significantly throughout the Holocene. Thus the present topography is an accurate reflection of the topography which existed during a pre-Holocene occupation of the site.

APPENDIX I (cont.)

APPENDIX I-A - Core Descriptions

Core # PL12-4-85-1

Depth (cm)	Description
0-30	clayey silt (20% clay); (10 YR 5/4) (moderate yellowish brown)
30-61	clayey silt (5% clay); (5 YR 5/6) (light brown)
61-91	sandy silt (some coarse sand); light brown (5 YR 5/6) to moderate yellowish brown (10 YR 5/4)
91-122	silty sand (sand is medium, coarse and fine), some light orange & white mottles a few mm across; light brown (5 YR 5/6)

Core # PL12-4-85-2

Depth (cm)	Description
0-30	sandy clayey silt (5% clay), medium-fine sand; moderate yellowish brown (10 YR 5/4)
30-61	sandy clayey silt (10% clay); light brown (5 YR 5/6)
61-91	sandy silt (medium-coarse sand); light brown (5 YR 5/6 to moderate yellowish brown (10 YR 5/4)
91-122	silty sand, rare pebbles; dark yellowish orange (10 YR 6/6)

Core # PL12-4-85-3

Depth (cm)	Description
0-30	sandy (medium-coarse), clayey (10%) silt; moderate yellowish brown (10 YR 5/4)
30-61	silty clayey sand (medium-coarse); moderate yellowish brown (10 YR 5/4)

APPENDIX I (cont.)

APPENDIX I-A (cont.)

Core # PL12-4-85-3

Depth (cm)	Description
61-91	pebbly medium-coarse sand; light brown (5YR 5/6)
91-122	pebbly medium-coarse sand; (10 YR 6/6) dark yellowish orange to (5 YR 5/6) light brown

Core # PL12-4-85-4

Depth (cm)	Description
0-30	sandy (medium), clayey (10%) silt; moderate yellowish brown (10 YR 5/4)
30-61	sandy (medium-coarse) clayey (5%) silt, some rust-colored mottles to 1 cm in diameter; grayish orange (10 YR 7/4)
61-91	pebbly medium-coarse sand; grayishorange (10 YR 7/4), numerous white and orange-colored mottles

Core # PL12-4-85-5

Depth (ft)	Description
0-0.25	organic-rich sandy silt;(5 YR 2/1) brownish black)
0.25-0.6	sandy (medium-coarse) clayey (5%) silt; moderate yellowish brown (10 YR 5/4)
0.6-1.4	pebbly, sandy (medium-coarse) clayey (5%) silt; moderate yellowish brown
>1.4 (exposed to 3.5)	pebbly medium-coarse sand; orange mottles to several cm in diameter; grayish orange (10 YR 7/4)

APPENDIX I-A (cont.)

Core # PL12-9-85-1

Depth (cm)	Description
0-30	clayey (10%) sandy (medium-coarse) silt, rare gravel (granules); moderate yellowish brown (10 YR 5/4)
30-61	silty medium-coarse sand, rare gravel (granules); moderate yellowish brown-dark yellowish orange (10 YR 5/4 - 10 YR 6/6)
61-122	silty medium-coarse sand; light brown (5YR 5/6)

Core # PL12-9-85-2

Depth (cm)	Description
0-30	sandy clayey (10%) silt; very pale orange (10 YR 8/2)
30-61	silty medium-grained sand, orange (rust) mottles; very pale orange (10 YR 8/2)
61-91	silty medium-grained sand, occasional orange (rust) mottles; very pale orange (10 YR 8/2)
91-122	silty medium-grained sand; very pale orange (10 YR 8/2)

Core # PL12-9-85-3

Depth (cm)	Description
0-30	silty clayey (10%) medium-coarse sand; dark yellowish brown (10 YR 4/2)
30-61	silty medium-coarse sand, occasionally mottled; very pale orange (10 YR 8/2)
61-91	sandy (medium-coarse grained) silt, silty medium-coarse grained sand, rare gravel (granules and pebbles), occasionally mottled; very pale orange (10 YR 8/2)

APPENDIX II: METHODS OF ATTRIBUTE ANALYSIS OF DEBITAGE

The purpose of this appendix is to outline and describe the methods used to analyze the debitage from the Paradise Lane Site and other archaeological sites discussed in this report. The main goal of the analysis is to determine the source of the debitage, particularly to see if it was derived from bifaces or from cores. This appendix will first outline the theoretical basis for studying the question of the bifacial or unifacial core origin of flakes. Next, it will describe the flake attributes used to study the debitage with respect to its origin. Finally, a series of base line studies of flakes of known bifacial or unifacial origin will be presented to show the validity of the research methods.

Theoretical Background

It is important to know whether debitage was derived from bifaces or from unifacial prepared, or amorphous, cores for a number of reasons. At the most basic level, organization of lithic technologies and patterns of lithic resource use are closely linked to settlement patterns and adaptations in various ways. Gardner's (1974; 1977; 1989; 1990) analyses of Paleo-Indian lithic technologies and lithic resource use are some of the first of these studies to be undertaken in the Middle Atlantic and recent studies have more closely analyzed the general trends noted by Gardner (eg. - Custer, Cavallo, and Stewart 1983; Stewart 1990). Other more generalized studies (eg. Bamforth 1986; Binford 1977; Bleed 1986; Goodyear 1979; Kelly 1988; Parry and Kelly 1987; Shott 1989; Torrence 1987; White and Modjeska 1978; Wiant and Hassen 1985; Magne 1985) have addressed similar issues.

Most of these studies have shown that factors such as settlement mobility, lithic resource availability, and the situational contingency of lithic tool use all play a role in determining how lithic technologies are organized, particularly the use of curated bifaces and prepared cores versus the expedient use of cores. For example, highly mobile groups who frequent areas where lithic resources are scarce have been seen to use carefully curated stone tool kits consisting of bifaces and prepared cores. On the other hand, less mobile groups in areas of readily available lithic raw materials will tend to make expedient use of quickly prepared amorphous cores. And, in some cases a single group will alter its resource use based strictly on the availability of raw materials. For example, Paleo-Indian groups in the Shenandoah Valley of Virginia made and used carefully prepared tool kits based on bifaces and prepared cores when they were traveling away from the major quarry sources of jasper near the western margin of the Blue Ridge Mountains (Gardner 1989; Verrey 1986). However, at hunting and processing sites close to the quarry sites, they expediently used a variety of amorphous cores (Carr 1986). In sum, it can be very useful to know whether an assemblage of debitage was derived from bifaces or cores in order to determine if the prehistoric groups who inhabited a site were focusing their lithic technologies on bifaces or cores.

When considering the lithic technologies of prehistoric groups of the Delmarva Peninsula, it should be noted that numerous studies of lithic technologies have shown that there is a large amount of variability in the use of bifaces or unifacial cores as portable tool kits. For example, a close analysis of late Paleo-Indian/Early Archaic tool kits from the central Eastern Shore of Maryland (Lowery and Custer 1990) has shown that these early groups made extensive use of bifaces as the central element of their transported tool kit during part of their journeys across the landscapes of the Delmarva Peninsula, where lithic resources were at a premium. This use of bifaces has been seen as one reason for a focused use of cryptocrystalline materials (Goodyear 1979; Custer 1989:119). However, when their transported, or curated (Binford 1979b) tool kits were depleted, they seem to have focused more on unifacial cores (Lowery 1989) procured and produced on an expedient, or as-needed, basis. In contrast numerous studies of lithic technologies of later groups (eg. - Custer and Bachman 1986; Custer 1987; Custer et al. 1988) indicate that there was a greater emphasis on cores, rather than bifaces, as sources of flakes in transported and curated tool kits during the Woodland I Period when levels of residential mobility were somewhat lower than at earlier times.

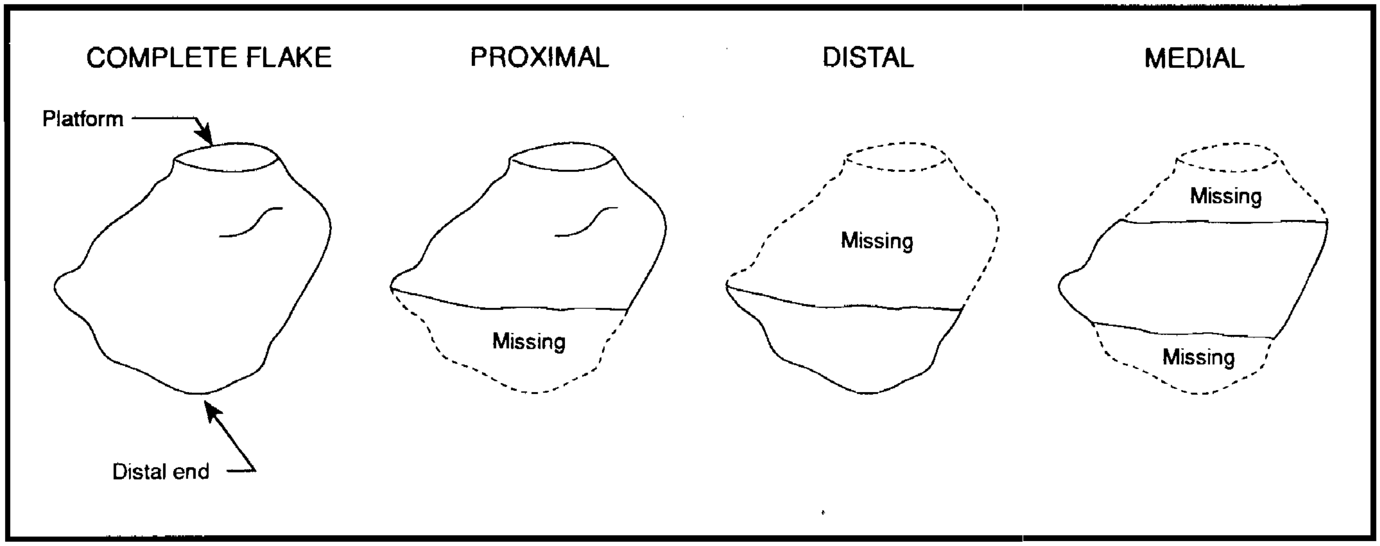
Studies of lithic technologies of northern Delaware, in the immediate vicinity of the Paradise Lane Site have shown other sources of variability in the composition of stone tool kits and patterns of lithic resource use. Cobble beds are quite numerous along the Fall Line and the adjacent areas of the High Coastal Plain and these locales are important sources of secondary raw materials which are suitable for the manufacture of stone tools (Custer and Galasso 1980). At the same time, high quality primary cryptocrystalline lithic resources are available from the Delaware Chalcedony Complex (Custer, Ward and Watson 1986) which is located just south of the Fall Line in western New Castle County, Delaware, and eastern Cecil County, Maryland. All of these sources of lithic raw materials were used by the prehistoric inhabitants of northern Delaware and the variety of uses seem to be greatest during the Woodland I Period. Some groups seem to be making use of secondary cobble resources for both bifaces and cores, although cobble resources seem to be more commonly used for cores (eg. - Custer 1987; Custer and Bachman 1986; Custer et al. 1981). On the other hand, some groups seem to have transported large cores of cryptocrystalline jasper and used them as a source for flake tools (eg. - Custer et al. 1988).

Because the tools and debitage deposited at a site by its prehistoric inhabitants reflect the lithic materials which they had with them, or could obtain locally at the site, and because curated lithic materials reflect immediately prior visits to quarry sites or other lithic source locations, we can understand the movement patterns of prehistoric groups by comparing the range of lithic resources used at a site with the locally available materials. Furthermore, if we can determine whether the flakes were derived from bifaces, prepared cores, or amorphous expediently-manufactured cores, we can understand how prehistoric groups were transporting and using lithic resources.

Prior research (Watson and Custer 1990) has shown that there are important regional differences in lithic transport and use in the central Middle Atlantic region that can reveal much about movement patterns, settlement mobility, and patterns of organization of lithic technologies. In the central and southern New Jersey Coastal Plain and the central Delaware region, particularly the St. Jones and Murderkill drainages, lithic resource use during early Woodland I times seems to be focused on the use of argillite and rhyolite for bifaces and cryptocrystalline cobble cores for flake tools. In contrast, contemporary groups of the Fall Line zone and High Coastal Plain of Delaware have a very different and highly variable technological organization based on a use of primary jasper and cherts for both large cores and bifaces, cobble resources for both cores and bifaces, and some ironstone, argillite, and rhyolite for bifaces. These lithic resource patterns are so very different that they might be indicators of varied ethnic groups using different territories, or they might be indicative of the incredible variability of lithic resource use patterns within a single social group. Application of the research methods described in this appendix will help us to better understand how prehistoric groups were using these different lithic resources at different locations across the landscape.

FIGURE 59

Flake Types



Flake Attributes

The attributes used in this analysis were selected from a variety of debitage attributes described in the work of Verrey (1986), Magne (1981; 1985), and Gunn and Mahula (1977), and are listed below:

1) Flake Type (complete, proximal, medial, or distal; Figure 59). This variable measures the degree of breakage of the flake assemblage and is useful because biface reduction tends to produce more broken flakes than does production of flakes from cores. Biface reduction produces more broken flakes because during biface reduction the emphasis is on effectively reducing the thickness of the biface (Callahan 1979) and the production of flakes takes on a more secondary role. In contrast, core reduction emphasizes the flake and fewer broken flakes result.

2) Presence or Absence of Cortex. This attribute helps to determine if the flake was derived from a primary or secondary raw material source.

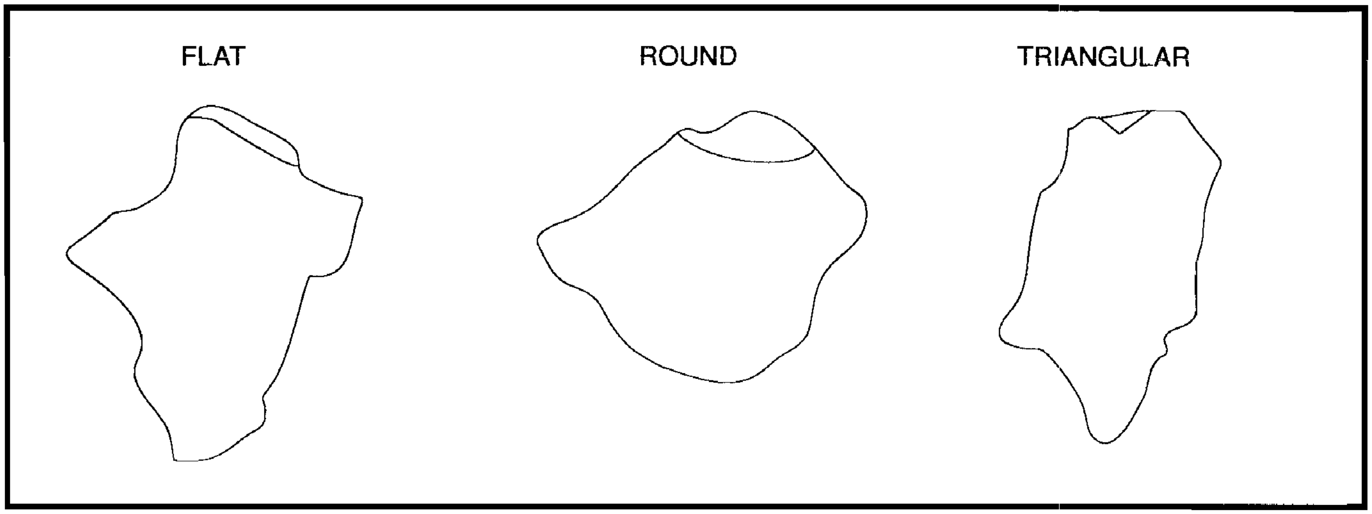
3) Flake Size (<2cm, 2cm-5cm, >5cm).

4) Number of Flake Scars on the Flake's Distal Surface. This variable was recorded because flakes produced from biface reduction tend to have more remnant flake scars on their dorsal surface than do flakes derived from cores due to earlier episodes of bifacial reduction.

5) Number of Directions from which the Flake Scars Were Struck. This variable is also related to the identification of flakes produced from bifacial reduction, as opposed to cores, because flakes from bifacial reduction will show a greater number of flake directions on their dorsal surface due to earlier episodes of biface reduction.

FIGURE 60

Platform Shapes



6) Shape of the Flake Platform (flat, round, triangular; Figure 60). Gunn and Mahula (1977) note that flat platforms are typical of flakes struck from cores, triangular platforms are typical of biface thinning flakes, and round platforms are typical of early stage biface reduction flakes and decortication flakes.

7) Presence or Absence of Remnant Biface Edges. This attribute is the best sign that a flake was derived from a biface rather than a core.

8) Presence or Absence of Platform Preparation. Platform preparation is more typical of biface reduction than removal of flakes from cores.

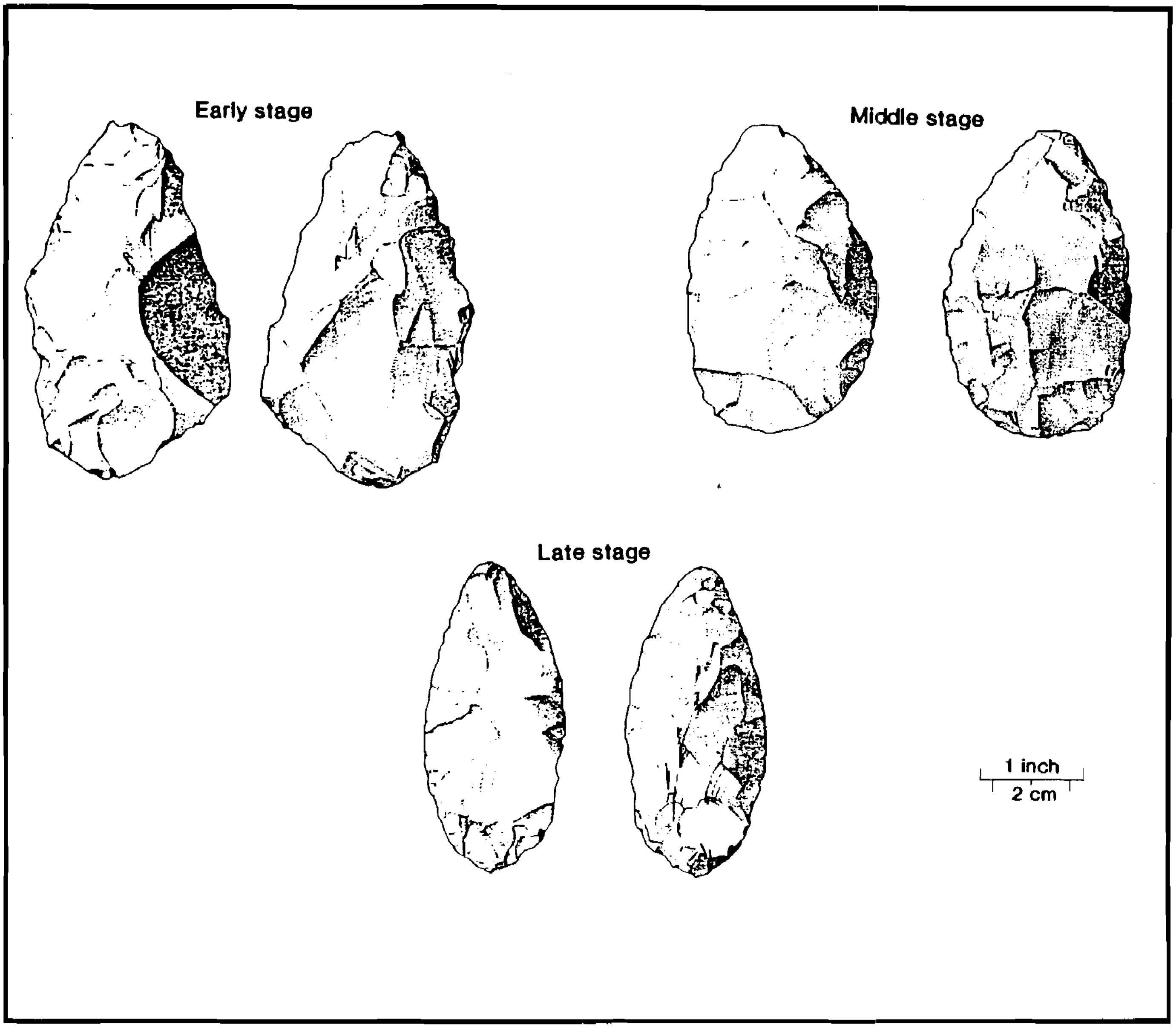
9) Presence or Absence of Retouch. This variable simply records whether or not the flake was retouched to have a particular edge shape.

Control Analyses

The attributes listed above have been shown to be sensitive to the discrimination of flakes derived from bifaces from flakes removed from cores in the studies noted above especially Gunn and Mahula (1977) and Magne (1981, 1985). Nonetheless, in order to test their validity as discriminating attributes, a series of control studies were undertaken using debitage from experimental reproductions of bifacial tools and debitage from archaeological contexts where refitting analyses confirmed the origin of flakes from either cores or bifaces. The first set of control debitage is a random sample of 100 flakes from the Fifty Site (44WR50), a stratified Paleo-Indian/Early Archaic site from the Shenandoah Valley of Virginia. Refitting of the debitage (Carr 1986) from the site has shown that the flakes are primarily derived from the reduction of amorphous and blocky cores of jasper. The remaining control samples of debitage were derived from the manufacture of three bifaces by Errett Callahan. The three bifaces are depicted in Figure 61. One is an early stage biface and the other two are middle to late stage bifaces (see Callahan 1979 for a description of the stages). All of the debitage from the bifaces was saved by stage so that the

FIGURE 61

Biface Production Stages



samples could be divided into early and late stage debitage. The middle stage biface was included as a late stage biface in the analyses.

Table 34 shows the distribution of the flake attributes for each of the bifaces, the late stage biface samples combined, all bifaces combined, and the core debitage from the Fifty Site (44WR50). Table 35 shows the values of the test statistics for a series of comparisons of the debitage samples using difference-of-proportion and difference-of-mean tests (Parsons 1974). The first set of test statistics shows a comparison of the debitage samples from the two late stage bifaces. Some differences are noted with one of the debitage assemblages showing significantly more complete flakes, more examples of platform preparation, and more complex patterns of flake scars on the flakes' distal surfaces. However, the second two comparisons noted in Table 35 show that both late stage biface debitage assemblages are

APPENDIX II (cont.)

TABLE 34

Distribution of Flake Attributes

Distribution	Callahan Early Stage Biface Number	Percent	Callahan Late Stage Biface 1 Number	Percent	Callahan Late Stage Biface 2 Number	Percent	All Late Stage Bifaces Number	Percent	All Bifaces Number	Percent	44WR50 Core Number	Percent
Flake type												
Complete	30	(11)	6	(4)	21	(18)	27	(11)	60	(12)	63	(63)
Proximal	51	(19)	52	(38)	44	(38)	96	(38)	147	(28)	19	(19)
Medial	76	(29)	37	(27)	20	(17)	57	(22)	133	(26)	4	(4)
Distal	106	(40)	43	(31)	32	(27)	75	(29)	181	(35)	14	(14)
Cortex												
Yes	162	(61)	4	(3)	0	(0)	4	(2)	166	(32)	0	(0)
No	104	(39)	134	(97)	117	(100)	251	(98)	355	(68)	100	(100)
Size												
Large	11	(4)	1	(1)	1	(1)	2	(1)	13	(2)	5	(5)
Medium	66	(25)	25	(18)	16	(14)	41	(16)	107	(20)	46	(46)
Small	189	(71)	112	(81)	100	(85)	212	(83)	401	(78)	49	(49)
Scar count												
Mean	1.81		2.25		2.13		2.19		2.00		1.33	
Standard deviation	1.01		0.82		0.86		0.84		0.95		1.22	
Directions												
Mean	1.52		2.06		1.80		1.94		1.73		0.73	
Standard deviation	0.81		0.66		0.25		0.69		0.78		0.60	
Platform shape												
Triangular	58	(67)	50	(91)	60	(91)	110	(91)	168	(81)	10	(10)
Round	8	(9)	5	(9)	3	(5)	8	(6)	16	(7)	37	(37)
Flat	20	(23)	0	(0)	3	(5)	3	(3)	23	(12)	35	(35)
Biface edge												
Yes	12	(13)	17	(31)	11	(17)	28	(23)	40	(19)	3	(3)
No	77	(87)	38	(69)	55	(83)	93	(77)	170	(81)	97	(97)
Platform preparation												
Yes	74	(90)	55	(98)	54	(82)	109	(77)	183	(88)	10	(10)
No	12	(10)	1	(2)	12	(18)	13	(23)	25	(12)	72	(72)
Number	268		141		119		260		528		100	

significantly different from the early stage biface. In general, there are significantly more complete flakes in the early stage assemblages, more small flakes in the later stage assemblages, more flake scars in more complex patterns among the late stage assemblages, and more triangular shaped platforms among the late stage assemblages. Because the late stage biface debitage assemblages were more like each other than they were like the early stage assemblage, these two samples were combined for analysis. A comparison of the early stage assemblage and the combined late stage sample is also noted in Table 35 and the results of comparison show the same pattern of significant differences noted above.

Figure 62 shows a comparison of the debitage assemblages from a core, the early stage biface, and the late stage bifaces. Test statistics from the comparisons of early and late stage bifaces are also noted in Table 35. With respect to flake types, the main difference between the biface and core debitage assemblages is the presence of significantly more complete flakes in the core assemblage. Significant differences are also noted in flake size with more smaller flakes present in the biface assemblages. Likewise, triangular-shaped platforms are significantly more common among the biface assemblages.

TABLE 35

Test Statistics for Comparisons

	Late stage biface 1/ Late stage biface 2	Early stage biface/ Late stage biface 1	Early stage biface/ Late stage biface 2	Early stage biface/ Late stage bifaces	44WR50/ Early stage biface	44WR50/ Late stage bifaces
Flake type						
Complete	3.52*	2.34*	1.73	0.29	10.06*	10.21*
Proximal	0.01	3.98*	3.79*	4.61*	0.08	3.37*
Medial	1.86	0.44	2.44*	1.70	5.11*	4.12*
Distal	0.67	1.80	2.42*	2.59*	4.76*	3.01*
Size						
Large	0.11	1.91	1.69	2.45*	0.34	2.56*
Medium	0.96	1.52	2.45*	2.46*	3.85*	5.89*
Small	0.92	2.21*	3.02*	3.27*	3.94*	6.55*
Scar count						
Mean	1.14	4.75*	3.19*	4.69*	3.511*	6.49*
Standard deviation	---	---	---	---	---	---
Directions						
Mean	4.32*	7.26*	5.13*	6.41*	10.16*	16.42*
Standard deviation	---	---	---	---	---	---
Platform shape						
Triangular	0.00	3.21*	3.44*	4.25*	8.11*	12.01*
Round	1.00	0.04	1.12	0.71*	4.14*	5.31*
Flat	1.60	3.86*	3.19*	4.69*	2.02*	6.63*
Biface edge						
Yes	1.85	2.53*	0.55	1.76	2.66*	2.57*
No	1.85	2.53*	0.55	1.76	2.66*	2.57*
Platform preparation						
Yes	2.92*	2.45*	0.71	0.72	10.39*	11.79*
No	2.92*	2.45*	0.71	0.72	10.39*	11.79*

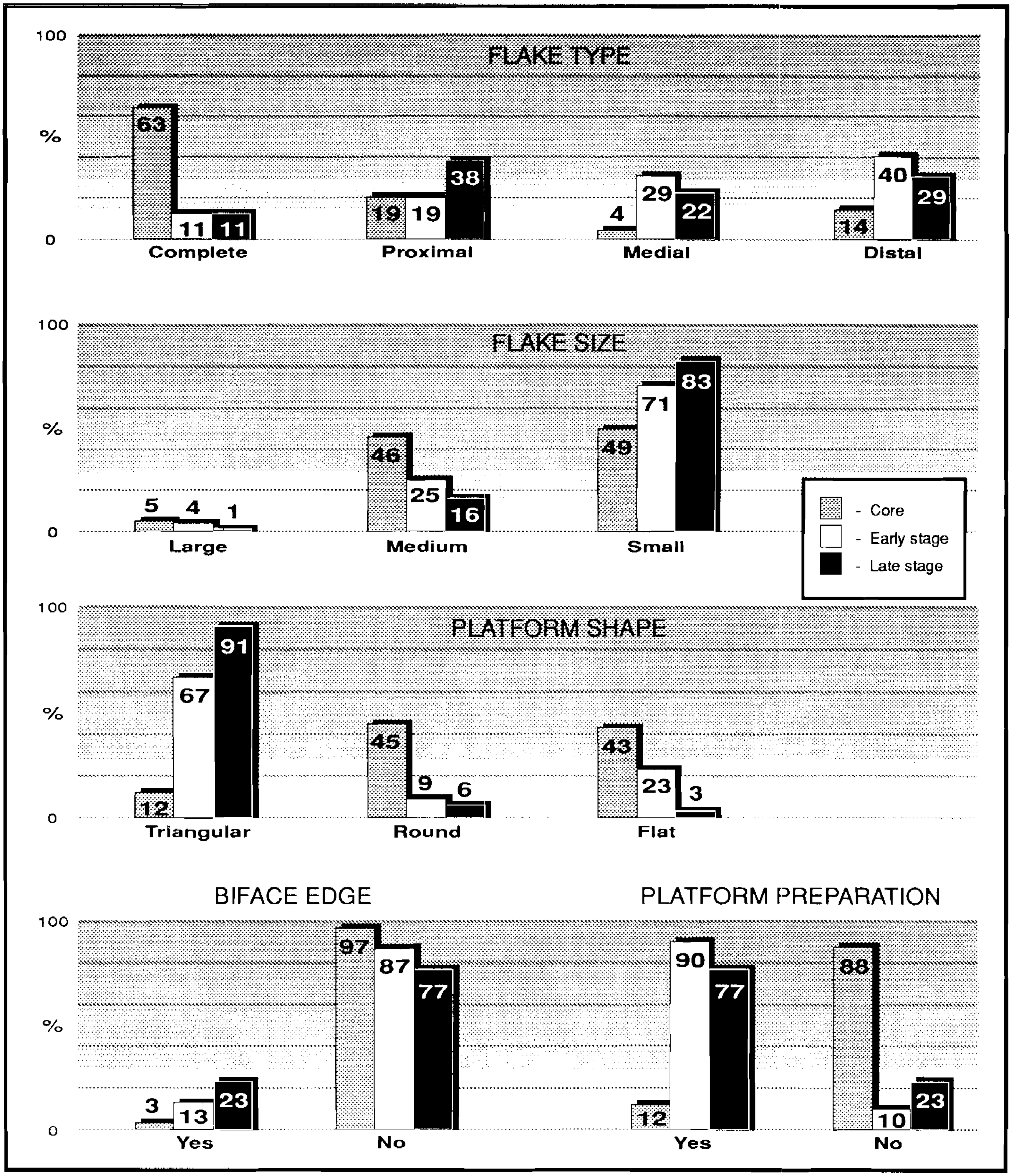
* - Statistically significant difference

Remnant biface edges are more common among biface assemblages, as expected, and platform preparation is significantly more common among the biface assemblages as well.

In general, the comparison of the control assemblages confirms the results of prior studies (Magne 1981, 1985; Gunn and Mahula 1977). For the most part, a debitage assemblage from biface reduction is characterized by low proportions of complete flakes, large proportions of small flakes, large proportions of flakes with triangular platforms, large proportions of remnant biface edges, and many instances of platform preparation. In contrast, core reduction debitage assemblages have large proportions of complete flakes, and few instances of triangular platforms, remnant biface edges, and platform preparation. These attributes will be applied to the debitage assemblages from the Paradise Lane Site and other sites in this report.

FIGURE 62

Comparison of Flake Attributes



APPENDIX III
RESULTS OF DIFFERENCE-OF-PROPORTION TESTS

Data Used in Difference-of-Proportion Test

	N*	Cortex	Cryptocrystalline	Quartz/Quartzite	Sources
7NC-D-125A	10,576	77	10,325	251	---
7NC-D-125B	1,931	41	1,778	147	---
7NC-D-125C	1,096	138	589	497	---
7NC-A-17	279	25	64	198	Custer and Hodny 1989
7NC-A-2	845	18	153	568	Custer and De Santis 1985
7NC-D-129	2,207	146	1,624	572	Custer et al. 1988
7NC-D-140	133	28	99	33	Catts, Hodny, and Custer 1989a
7NC-E-9	4,090	585	3,316	748	Custer et al. 1990
7NC-E-46	10,512	2,102	2,312	7,253	Custer and Bachman 1984
7NC-E-6A(2A)	5,515	496	3,306	1,879	Custer 1982
7NC-E-6A(2B)	6,206	532	4,434	1,450	Custer 1982
7NC-D-5	94	0	56	30	Custer, Ward, and Watson 1986
7NC-D-19	653	0	483	170	Custer, Ward, and Watson 1986
7NC-D-55A	132	59	39	91	Custer et al. 1981
7NC-F-61A	1,922	22	1,902	18	Watson and Riley n.d.

* Total number of lithic artifacts from site assemblage

Cortex

	7NC-D-125A	7NC-D-125B	7NC-D-125C	7NC-A-17	7NC-A-2	7NC-D-129	7NC-D-140	7NC-E-9	7NC-E-46	7NC-E-6A(2A)	7NC-E-6A(2B)	7NC-D-5	7NC-D-19	7NC-D-55A	7NC-F-61A
7NC-D-125A	X														
7NC-D-125B	+	X													
7NC-D-125C	+	+	X												
7NC-A-17	+	+	0	X											
7NC-A-2	+	0	+	+	X										
7NC-D-129	+	+	+	0	+	X									
7NC-D-140	+	+	+	+	+	+	X								
7NC-E-9	+	+	0	+	+	+	+	X							
7NC-E-46	+	+	+	+	+	+	0	+	X						
7NC-E-6A(2A)	+	+	+	0	+	+	+	+	+	X					
7NC-E-6A(2B)	+	+	+	0	+	+	+	+	+	0	X				
7NC-D-5	0	0	+	+	0	+	+	+	+	+	+	X			
7NC-D-19	+	+	+	+	+	+	+	+	+	+	+	0	X		
7NC-D-55A	+	+	+	+	+	+	+	+	+	+	+	+	+	X	
7NC-F-61A	0	+	+	+	+	+	+	+	+	+	+	0	+	+	X

Key: + = Significant difference
0 = No difference

APPENDIX III (cont.)

Cryptocrystalline

	7NC-D-125A	7NC-D-125B	7NC-D-125C	7NC-A-17	7NC-A-2	7NC-D-129	7NC-D-140	7NC-E-9	7NC-E-46	7NC-E-6A(2A)	7NC-E-6A(2B)	7NC-D-5	7NC-D-19	7NC-D-55A	7NC-F-61A
7NC-D-125A	X														
7NC-D-125B	+	X													
7NC-D-125C	+	+	X												
7NC-A-17	+	+	+	X											
7NC-A-2	+	+	+	0	X										
7NC-D-129	+	+	+	+	+	X									
7NC-D-140	+	+	+	+	+	0	X								
7NC-E-9	+	+	+	+	+	+	0	X							
7NC-E-46	+	+	+	0	+	+	+	+	X						
7NC-E-6A(2A)	+	+	+	+	+	+	+	+	+	X					
7NC-E-6A(2B)	+	+	+	+	+	0	0	+	+	+	X				
7NC-D-5	+	+	0	+	+	+	+	+	+	0	+	X			
7NC-D-19	+	+	+	+	+	0	0	+	+	+	0	+	X		
7NC-D-55A	+	+	+	0	+	+	+	+	+	+	+	+	+	X	
7NC-F-61A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	X

Quartz/Quartzite

	7NC-D-125A	7NC-D-125B	7NC-D-125C	7NC-A-17	7NC-A-2	7NC-D-129	7NC-D-140	7NC-E-9	7NC-E-46	7NC-E-6A(2A)	7NC-E-6A(2B)	7NC-D-5	7NC-D-19	7NC-D-55A	7NC-F-61A
7NC-D-125A	X														
7NC-D-125B	+	X													
7NC-D-125C	+	+	X												
7NC-A-17	+	+	+	X											
7NC-A-2	+	+	+	0	X										
7NC-D-129	+	+	+	+	+	X									
7NC-D-140	+	+	+	+	+	0	X								
7NC-E-9	+	+	+	+	+	+	0	X							
7NC-E-46	+	+	+	0	0	+	+	+	X						
7NC-E-6A(2A)	+	+	+	+	+	+	+	+	+	X					
7NC-E-6A(2B)	+	+	+	+	+	+	0	+	+	+	X				
7NC-D-5	+	+	+	+	+	0	0	+	+	0	0	X			
7NC-D-19	+	+	+	+	+	0	0	+	+	+	0	0	X		
7NC-D-55A	+	+	+	0	0	+	+	+	0	+	+	+	+	X	
7NC-F-61A	+	+	+	+	+	+	+	+	+	+	+	+	+	+	X

Key: + = Significant difference
0 = No difference

APPENDIX IV
TOTAL ARTIFACT COUNTS

	Area A	Area B	Area C
Flakes			
Quartzite	24(3)	28(7)	85(19)
Quartz	229(14)	111(15)	399(32)
Chert	26(4)	21(3)	240(47)
Jasper	8592(42)	1688(15)	301(30)
Chalcedony	7	44	24(1)
Rhyolite	1		9(1)
Argillite	2	1(1)	
Ironstone		4	
Utilized flakes			
Jasper	2	3	
Quartz			1(1)
Flake tools			
Jasper	1	1	
Archaic points			
Rhyolite		1	
Woodland I points			
Quartzite	1		
Quartz	2	2	4(1)
Chert		2	1
Jasper	5	1	4(1)
Chalcedony			1(1)
Rhyolite			1
Unidentified points			
Jasper		1	
Early stage biface rejects			
Quartz	1	3(1)	5
Chert	2	1	
Jasper	14(2)	7	1(1)
Chalcedony	1		1
Late stage biface rejects			
Quartzite		3	1
Quartz	1		
Jasper	7	5	7(1)
Chert			2
Chalcedony			3
Drill			
Argillite			1
Other bifaces			
Quartz	4		
Jasper	27		
Cores			
Quartzite	2		1(1)
Quartz	2		
Jasper	11(1)	3	
Ironstone			1(1)
Shatter		8(1)	1(1)
Fire-cracked rocks (count and weight)	52 - 9489g	20(2) - 4160g	212 - 13,064g
Hammerstone (count and weight)			1 - 427.5g
Prehistoric ceramics	238		39
Historical artifacts	113	80	312

( ) = cortex

Note: The artifact counts by Unit and Level for the Paradise Lane site Areas A, B, and C are available upon request:

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APPENDIX V: GLOSSARY

Aboriginal - Prehistoric peoples in North America.

Aeolian - Carried by the wind.

Alluvium - Deposits of gravel, sand, and soil which are transported by flowing water.

Archaeology - The study of the people of the past through the recovery and analysis of the artifacts they left behind and their context.

Artifact - Any object shaped or modified by man, or as a result of human activity.

Assemblage - The array of contemporary objects and associations found at an archaeological site.

Base camp - A prehistoric dwelling site for hunter-gatherers from which resource procurement forays are made.

Battering Tool - A stone tool used for flint knapping such as a hammerstone, or for food processing.

Bay/Basin Feature - Also known as whale wallows, these shallow ponds, thought to have been formed during the end of the Pleistocene, represent a favored prehistoric settlement location.

Biface - A stone tool that has been flaked on both sides.

Boreal - The forest areas and tundras of the North Temperate Zone and Arctic region.

B. P. - Years before present, which has been standardized at A.D. 1950.

Cache - A collection of artifacts and/or ecofacts which have been deliberately stored for future use.

Catchment - The area surrounding a habitation site from which resources are obtained.

Cobble - Frequent lithic tool resource for prehistoric peoples.

Colluvium - A loose deposit of rock debris accumulated at the base of a cliff or slope.

Contracting Stem Point - A point that has a stem with sides which come inward; opposite of flared point.

Core - A piece of stone from which other pieces of stone are flaked off to make artifacts.

Cortex -Weathered exterior of a piece of lithic material, may be either vein or water-worn cortex.

Cretaceous Geologic Period - The third period of the Mesozoic era characterized by the development of flowering plants and the disappearance of dinosaurs.

Cryptocrystalline - Indistinctly crystalline; having an indistinguishable crystalline structure (i.e. - chert and jasper).

Culture - The nonbiological mechanism of human adaptation.

Curated Technology - When artifacts are reused and transported so often that they are rarely deposited in contexts which reflect their actual manufacture and use.

Dames Quarter Black Stone Tempered - A Woodland I (1200 B.C. - 700 B.C.) modeled and possibly coiled ceramic characterized by flat bottoms and tempered with crushed black hornblende or gneiss. Surfaces are usually smooth and occasionally the flat bases are mat impressed.

Debitage - Waste material from the manufacture of stone tools.

Deciduous - Leaf bearing trees that shed in autumn.

Decortication - The removal of cortex from lithic cobbles.

Diagnostic - Artifact with identifying traits that categorize the item to a specific time period.

Direct Percussion - Part of the lithic reduction process, a percussor is directly applied to the worked material with a sharp blow.

Discards - Stone tools which have been heavily resharpened and modified to be further utilized as tools.

Distal End - Reference to the pointed end of a projectile point.

Early Stage Biface Discard - A biface which was used as a tool early in its manufacturing/reduction stage, and then later discarded, usually due to extensive damage.

Early Stage Biface Reject - A biface that never passed beyond the initial steps of stone tool production due to either flaws in the raw material or manufacturing error.

Ecofact - The nonartifactual remains found in archaeological sites such as seeds, bones, and plant pollen.

Ecotone - An ecological community of mixed vegetation formed by the overlapping of adjoining communities.

Edaphic Factors - The factors in an environment which are due to the physical, chemical, and biological characteristics of the soil.

APPENDIX V (cont.)

Facie - A stratigraphic body distinguished from others by appearance or composition.

Fall Line - A transition zone from the Piedmont Uplands to the flatter Coastal Plain.

Feature - Any soil disturbance or discoloration that reflects human activity or an artifact that, being too large to remove from a site, normally is recorded only; for example, house, storage pits, etc. can also be a very dense collection of artifacts: for example, a lithic chipping feature.

Feldspar - Silicates of aluminum, containing sodium, potassium, calcium, or barium or combinations of these elements. Clay is the chief substance formed when weathering decomposes feldspars.

Fire-cracked Rock - A rock that has fractured and/or discolored due to exposure to fire.

Flake - A piece of waste material from the manufacture of stone tools, caused by percussion or pressure applied to the object by an external agent (e.g. hammerstone, antler pressure-flaker); flake itself may be further utilized as a tool (see "Debitage").

Flotation - The use of fluid suspension to recover tiny plant and bone fragments from archaeological sites.

Fluvial - Produced by the action of flowing water.

Geomorphology - The geologic study of the configuration and evolution of land forms.

Gley - A soil horizon in which the material is bluish gray or blue-gray, more or less sticky, compact, and often structureless. It is developed under the influence of excessive moisture.

Ground Stone Tool - A tool that has been produced by grinding or pecking.

Hammerstone - A rounded stone to be used as a hammer and which is sometimes grooved for hafting to a handle. Usually ungrooved, however, it has a variety of forms ranging from a crudely shaped sphere to a finely ground ovoid with a battered end.

Hell Island Ware - A Woodland I (A.D. 600 - A.D. 1000) conoidal shaped ceramic tempered with finely crushed quartz and mica inclusions, whose exterior surface may be fabric impressed or cord impressed.

Historic - The time period after the appearance of written records. In the New World, this generally refers to the time period after the beginning of European settlement at approximately 1600 A.D.

Holocene - The latest division of the Quaternary period, which commenced around 12,000 B.P.

Indirect Percussion - In the lithic reduction process, a punch is held against the worked material and the punch is struck a sharp blow with a percussor.

In Situ - In the original place.

Interface - A surface regarded as the common boundary of two bodies or spaces.

Ironstone - One of several kinds of iron ore with admixtures of silica and clay.

Late Stage Biface Reject - A biface which was either broken during the later stages of manufacture, or which had been reduced improperly, so that further reduction would not produce a usable tool.

Lithic - Pertaining to or consisting of stone.

Loam - A loose soil composed of roughly equal parts of silt,clay and sand, especially a kind containing organic matter and of great fertility.

Locus - A defined archaeological site or testing location.

Loess - A homogenous, non-stratified, unindurated deposit consisting predominantly of silt, with subordinate amounts of very fine sand and/or clay.

Macro-band Base Camp - For a hunter-gatherer society, an archaeological site one hectare or larger in area characterized by a wide variety of tool types, abundant ceramics, semi-subterranean house structures, storage pit features, and abundant debitage from tool manufacture and reduction.

Marcey Creek Plain - A Woodland I (1200 B.C. - 900 B.C.) ceramic tempered with crushed steatite characterized by flat-bottomed vessels made by modeling with lug handles sometimes used. The first true ceramics of Delaware.

Megafauna - A number of species of presently extinct large mammals including musk ox, grazing mammoth, browsing mastodon, giant moose, elk, caribou, white-tailed deer, and giant beaver.

Mesic Forest - A vegetation pattern characterized by relatively wet-adapted plant species, such as oak and hemlock forests.

Micro-band - A component of macro-band, perhaps one or two extended families, which periodically operates independently of the macro-band group.

Microenvironment - A characteristic biotic assemblage, often exploited by a distinctive ecological niche.

Midden - Refuse deposits resulting from human activities, generally consisting of soil, food remains such as animal bone and shell, and discarded artifacts.

Minguannan Ware - A Woodland II (A.D. 1000 - A.D. 1600) ceramic tempered with sand, grit, and crushed quartz whose surface treatment includes smoothed surfaces, corded surfaces, and smoothed-over-corded surfaces. Decorations include incising, cord-wrapped-stick, and direct cord impressions.

Mockley Ware - A Woodland I (A.D. 110 - A.D. 1000) conoidal shaped ceramic tempered with oyster shell or ribbed mussel whose exterior surface may be smoothed, cord marked, or net impressed.

Notched Point - Areas cut into a point which were used to bind the point to a shaft.

Pedestrian Survey - The walking and collecting of an archaeological site without the excavation of subsurface units.

Pedogenic - Referring to the development of soils in place.

Physiographic Zone - Regions or areas that are characterized by a particular geography, geology, and topography.

Piedmont Region - An area of gently rolling to hilly land lying between the Appalachian Mountains and the Atlantic Coastal Plain. The division between the Piedmont Region and the Coastal Plain is marked by the Fall Line.

Pleistocene - A division of the geologic Quaternary Period, which began around 2.3 to 3 million years ago and is associated with rapid hominid evolution from Australopithecinae to Homo sapiens sapiens.

Plow zone - In a plowed field, the upper layer of organic soil which is continually reworked by the plow. In the Middle Atlantic region this is about 8-12 inches thick.

Prehistoric - The time period before the appearance of written records. In the New World this generally refers to indigenous, pre-Contact societies.

Primary Lithic Resource - Outcrops of workable stone that are found within the matrix of their original formation.

Procurement Site - A place that is visited because there is a particular item to acquire; i.e., lithic outcrops.

Projectile Point - Strictly speaking, a biface attached to the head of an airborne item of weaponry, like an arrow or a thrown dart; frequently used indiscriminately when referring to any biface.

Pseudo-cord - Method of impressing designs in ceramics by use of a cord-wrapped stick.

Quarry Reduction Station - A place where material obtained from a quarry site such as large flakes, cores and very early stage bifaces were taken for further reduction into smaller primary-thinned bifaces.

Quarry Site - A site located at either a primary or secondary outcrop of high-quality lithic material used in the manufacture of stone tools.

Rejects - Stone tools which have been thrown away due to manufacturing or material flaws.

Secondary Lithic Resource - Cobbles and boulders of variable size that have been removed from the matrix of their original formation, transported by alluvial or glacial agents, and redeposited at a new location which may be quite distant from their original source.

Selden Island Ware - A Woodland I (1000 B.C. - 700 B.C.) ceramic of modeled or coiled construction with round or flat bases. The flat bases are associated with modeled vessels and the round bases are associated with coiled vessels. Cord impressed exteriors are common and the temper is steatite.

Sherd - A piece of broken pottery.

Site - A space of ground containing evidence of human occupation that archaeologists select for their dig.

Soapstone - Steatite, a soft material that was carved with stone tools to produce stone bowls etc.

Soil Horizon - Soils are divided in 3 horizons, which reflect different kinds of chemical and physical processes that have resulted from changing climatic conditions.

Staging Site - A temporary camp where preparations are made for another operation such as a hunting foray.

Stemmed Point - A point that has an obvious area which was used to bind or haft a point to a shaft.

Strata - The various layers of human or geological origin which comprise archaeological sites.

Stratigraphy - The examination of the soil layering on an archaeological site; the characteristics of each individual stratum and its relationship to others in the sequence is critical to understanding the temporal and spatial characteristics of the site.

Subsoil - Sterile, naturally occurring soils not changed by human occupation.

Surface Collection - Act of walking along a surface such as an open field or plowed field, and collecting artifacts seen on the surface of the ground.

Susquehannock Indians - Iroquoian people living along the lower reaches of the Susquehanna River.

Temper - The foreign material introduced into clay to keep pottery from cracking when fired; also known as "grog".

Tool Kit - A collection of artifacts from a sealed context within a site interpreted as being designed for a specific function.

Topography - The surface physical features and configuration of land.

Townsend Ware - A Woodland II (A.D. 1000 - A.D. 1650) ceramic tempered with crushed shell with fabric-impressed exterior surfaces. Decorations include incising, cord-wrapped stick and direct cord designs.

Transect - A single strip of land crossing an area possibly containing an archaeological site. Archaeologists may search a transect rather than survey the whole area.

Transect Sampling - A means of archaeological research design in which the sampling element is a square or rectangular grid.

Transverse Fracture - A break which is directed horizontal to the vertical axis of a point.

Uniface - A stone tool that has been flaked only on one side.

Wolfe Neck Ware - A Woodland I (700 B.C. - 400 B.C.) conoidal shaped ceramic tempered with crushed quartz whose exterior surface may be cord marked or net impressed.

Xeric Forest - A vegetation pattern characterized by relatively dry-adapted plant species, such as grasslands and forests of oak and hickory.